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PROGRESS REPORT

ON THE

DAIRY INDUSTRY OF DENMARK,

BY

PROF. C. C. GEORGESON,
Special Agent of the U. S. Department of Agriculture.

PUBLISHED BY AUTHORITY OF THE SECRETARY OF AGRICULTURE.

PROGRESS REPORT ON THE DAIRY INDUSTRY OF DENMARK.

LETTER OF TRANSMITTAL.

COPENHAGEN, DENMARK,
February 7, 1893.

SIR: I have the honor to submit the following brief preliminary report on the dairy industry of Denmark, which, in accordance with your instructions, I am now investigating. Though little more than a report of progress, it is presented in the hope that it will prove of service to the dairy workers of the United States.

Very respectfully,

C. C. GEORGESON,
Special Agent.

Hon. J. M. RUSK,
Secretary of Agriculture.

THE MILK-SUPPLY STATION OF COPENHAGEN.

At this writing I have been eleven days in Denmark, and most of this time has been spent in Copenhagen, where a large share of the dairy interest is centered, and where it was essential that I should make the acquaintance of the leading scientists who are interesting themselves in dairying. First among these should be mentioned Prof. T. R. Segelcke, who has labored incessantly for the improvement of the dairy methods in Denmark ever since 1860, when, as a young but thorough agricultural chemist, he first became connected with the Royal Agricultural Society of Denmark. He is now, and for nearly twenty years past has been, professor of dairy science at the Royal Agricultural College, Copenhagen. He has aided in educating in dairying more than a thousand young men, and through them his influence on the dairy interest has been preëminent. If he is less known to American dairymen than the lamented Prof. N. J. Fjord, who laid down his labors two years ago, it is because his work at the college has been chiefly in the line of instruction, while Prof. Fjord worked as an investigator. Another scientist who of late years has given much study to dairy questions is Prof. V. Storch, of the experimental laboratory. He has especially studied those organisms which influence the consistency, flavor, and aroma of butter, and has succeeded in perpetuating pure cultures of several of these.

I took early occasion to visit the city milk-supply station of Copenhagen, which I shall briefly describe. I am aware that it has already been partially described in our agricultural press, but it is an institution of such extraordinary interest, owing to the methods there adopted in handling milk, that it will bear further mention, and should serve as a worthy example for our many large cities to follow. It is in the hands and under the exclusive control of a private organization. Neither the Government, city, nor State has anything whatever to do with it. It should also be explained that it does not by any means supply all the milk consumed in Copenhagen. Just what part it supplies of the total amount consumed in the city I am unable to state, but it is considerably less than one-fourth. The Milk-supply Company of Copenhagen is simply an organization which has taken upon itself to supply its patrons with absolutely pure and wholesome milk at a slightly advanced price above what milk can be bought for from the numerous other sources of supply. The company began business some fifteen years ago on a small scale, but for the month of December, 1879, the daily sales averaged 9,733 Danish pounds (10,728 pounds avoirdupois), and for December, 1892, 36,194 Danish pounds (39,896 pounds avoirdupois), and this at the season when milk is scarcest. The merit of the system consists, first, in the strict rules which have been laid down concerning the quality of the milk; second, in the painstaking cleanliness which obtains in the handling of the milk; and, thirdly, in the unflinching enforcement of the rules mentioned. Each dairy farmer of whom the company buys the milk must agree to conform to the following requirements in every particular:

(1) The feed must be such that it does not affect the taste or character of the milk injuriously. The use of distillery slop and like substances for feed is absolutely prohibited, and the use of all feed that has been injured or is not well preserved. The use of turnips, kohlrabi, rutabagas, and the leaves of all kinds of root crops is prohibited. Carrots and mangels may be used to the extent of half a bushel per day for each cow, but only when the grain feed given amounts to 7 pounds per day. Cows which supply milk for the use of children must not be fed mangels and carrots beyond the extent of 1 peck per day. Oil cake (rape-seed cakes) may be fed to the extent of but 1½ pounds per day, and this only in connection with at least 5 pounds of grain feed. Cows supplying milk for the use of children must not be fed oil cake of any kind. For other cows the grain mixture used shall receive the company's approval before delivery of milk can begin.

(2) In the summer time the cows must not be fed in the barn under any conditions. They must be pastured on clover and grass. Vetches must not be used. When necessary, arrangement may be made with the company for the use of grain or green grain crops during the summer.

(3) The cows must be clipped on the udder, tail, and hind quarters in the fall before they are put in the barn.

(4) The time of calving of cows in the herd must be distributed as evenly as possible through the year, so that the amount of milk delivered, especially during September and October, shall not be less than two-thirds of the greatest amount delivered in any month.

(5) Fresh milk up to twelve days after calving must not be delivered, nor will the company receive milk from cows which give less than 6 pounds per day.

(6) The utmost cleanliness must be observed in milking, and the milk must be strained through a metal strainer covered with a clean woolen cloth.

(7) There must be at the disposal of the dairy at least 30 pounds of ice for every 100 pounds of milk produced on the farm.

(8) Every dairy must be supplied with a Lawrence milk-cooler. This may be rented from the company if desired.

(9) As soon as it is drawn from the cow, the milk must be cooled by the use of ice water on the milk-cooler, and this at all seasons of the year. This cooling should reduce the temperature of the milk to at least 4° Réaumur (41° F.) before it is shipped.

(10) The milk must be delivered at the railway station once or twice daily, as the company may desire, either as sweet milk or as half-skimmed milk and cream. It must not be sent from the dairy farm sooner than necessary to make the train, and in summer the delivery wagon must be covered so as to shade the cans.

(11) The company will supply the cans used for transportation, and they will be cleaned before they are shipped to the dairy farm.

(12) The cans must be rinsed in cold water immediately on their arrival at the dairy. They must be kept in an airy place, protected from all dirt, with the lids removed and opening downward, but so that the air has free access to the interior, until they are used.

(13) The can must under no circumstances be used for anything else than the transportation of milk.

(14) The dairy farmer must agree to answer all questions concerning the milk which the company may put to him.

(15) The dairy farmer must permit one of the company's veterinarians to examine his cattle whenever he choses, and must carry out the directions which the latter may give him. He must also agree to furnish transportation for the veterinarian to and from the railroad station.

(16) Cows which the veterinarian finds have tuberculosis must be removed from the herd at once and disposed of as soon as possible.

(17) Cows which are taken with any suspicious disease must be removed from the herd at once and the company informed of the fact, and if necessary the delivery of milk may be stopped until the veterinarian has had opportunity to examine the case. But in such cases the company will pay for the milk at the same rate as though it were delivered.

(18) If any contagious disease occurs among the persons who live on the farm, or at the homes of the laborers who work on the farm, it shall be the duty of the dairyman to inform the company of the fact at once. The milk will in such cases be paid for at the usual rate.

(19) This contract may be terminated either by the company or the dairyman on the first day of any year, but with at least six months' notice.

(20) Should the milk be found to be of so inferior a quality as to be unfit for sale, the company reserves the right to stop its delivery without remuneration.

(21) If the sale of milk in Copenhagen should be stopped by reason of an epidemic or other nonpreventible cause, the delivery must be stopped for a shorter or longer period without remuneration.

This very strict code is observed to the letter. At present the company receives milk from 42 dairy farms, representing in round numbers 4,600 milch cows. To watch the health of these cows the company employs three skilled veterinarians, who spend all their time in traveling from farm to farm in order to examine periodically each individual in the herds, and also to see that the rules as regards feeding, etc., are observed. When an animal is found to be suffering from any sort of disease, it is withdrawn at once. And should a disease occur suddenly the dairyman is encouraged in withdrawing of his own accord the animals so affected, and is paid the price of the milk which they give until one of the company's veterinarians can pass judgment on the case.

In addition to this the company employs a staff of trained dairymaids who travel from farm to farm, call unexpectedly, examine the surrounding conditions with special reference to cleanliness and care in milking, watch the feeding, the cooling of the milk, etc., and then promptly report the facts they obtain to the company on blanks furnished them for the purpose. On some of the larger farms such dairymaids are permanently located, the company paying the dairymen for their board. At present there are four such dairywomen located on as many farms. But the inspection does not end here. At the receiving station in Copenhagen a sample of the milk from each farm is taken immediately on its arrival and subjected to the Babcock test, a large machine of this pattern having been procured for that purpose a short time ago, and once or twice a month similar samples are subjected to chemical analysis. Moreover, when the sample is taken an experienced dairywoman stands by, who tastes and smells of the milk from each farm, and who quickly notes whether it falls below the high standard that is required.

I spent a night and the greater part of two days at the company's receiving and distributing station in order to watch its operations. Including the drivers of delivery wagons and the boys who assist them by carrying the milk from the wagon to the house, the number of employees is about 250. The milk is shipped to the city in the evening. The trains begin to arrive about 9 p. m., and continue until after midnight. The milk is at once hauled to this receiving station or dairy, where it is weighed, sampled, tasted, and the cans deposited in large vats of ice water, where they remain till 4 a. m., when the delivery wagons begin to make ready.

The cans are of tin, made very massive, and hold about 100 pounds each. Two forms are used, one round, the other square. The round cans are used for the unskimmed milk, and the square cans for the half-skimmed milk. Otherwise they are shaped like a jug, with contracted neck, into which a lid fits very closely. In the interior of the cans for unskimmed milk is an arrangement intended to equalize the distribution of the cream with the milk. It will be seen that when a can of sweet milk stands on a delivery wagon several hours the upper stratum of milk must be richer in cream than the lower stratum, and that if the milk is drawn from the bottom the first customer will practically get skim-milk and the last cream. To prevent such injustice, the tube or pipe in which the discharge valve is placed is continued clear to the top of the can on the inside, and a row of small holes the whole length of this tube admits the milk. Now, when the valve is opened, the milk is drawn neither from the bottom nor top of the can, exclusively, but through these small holes in the tube—from the whole side of the can from bottom to top, or as high as the milk may reach, equally. The weight of each can is stamped upon a brass plate which is soldered to the top of the can. This greatly facilitates weighing. Before leaving the farm, each can is sealed with a cord and a piece of lead stamped with a punch, in the same manner as our railroad freight cars are sealed. This precludes all possibility of tampering with the contents in transit, and a label bearing the name of the farm in large print is also pasted on each can.

The company supplies its customers with three grades of milk, namely, whole milk, half skim-milk, and milk for children, and with two grades of cream, designated, respectively, as first and second grade. The skim-milk received, and for which there is a large demand for use in cooking, is in most cases the morning's milk which has stood ten to twelve hours before shipment. The cream that may have risen is then skimmed off and shipped in separate cans. The children's milk is intended as food for infants. For this supply special cows are picked by the company's veterinarians, and these are fed somewhat differently, or at least with greater care than the others, and their milk is kept separate. This milk is filtered and bottled and the bottles sealed immediately on its arrival, and not allowed to stand in the cans till morning, as is the other milk. The ordinary whole and skim milk is also filtered before it goes to the customer, but this is done at 4 a. m., just before it is loaded into the delivery wagons.

The filtering machines are of special interest. There are several of them, and they vary somewhat in size, but otherwise the construction is the same. Imagine a large bowl of enameled iron with a capacity of about 40 gallons, and this raised on supports about 5 feet from the floor. There is a hole in the bottom through which the milk enters, and near the rim are two discharge pipes, one on each side of the bowl. Now, the filtering material consists of three layers of gravel and six thicknesses of fine muslin stretched over a ring that fits closely inside the bowl and is placed above the upper layer of gravel. The gravel is of three grades of fineness. The lower is about the size of duckshot, the middle layer finer still, and the upper layer as fine as small pinheads. Each layer rests upon a tin plate, perforated with many fine holes, and which fits closely to the sides of the bowl. Each layer is about 2 inches thick, and there is a space of an inch from the top of one layer to the tin plate which supports the next layer above. The milk is poured into a large reservoir which stands somewhat higher than the filter. A brass pipe leads from the bottom of this reservoir to the bottom of the filter bowl. The pressure thus attained forces the milk through the successive layers of gravel and the six thicknesses of cloth, and when it rises to the discharge pipes it runs off through these into the vessels placed for its reception. Such treatment throughout insures the customer that it is absolutely pure, clean, and wholesome.

Probably no other city in the world is blessed with so thorough a system of control as regards the quality of the milk. And be it noted that it is not done under compulsion of law, but as a piece of business enterprise in private hands. The constitution of the company forbids a greater dividend than 5 per cent and the price to the consumer is regulated on this basis. It further prohibits the two principal directors from having any financial interest in the company which might tempt them to work for greater profits. The prices paid to the producer for the milk are as follows: From the 1st of April to the 1st of September 20 öre* per "Kande" (2 kilograms = 4.409 pounds avoirdupois), which is very nearly $1.25 per hundred pounds avoirdupois. From September 1 to December 16, 26 öre per 2 kilograms, or $1.61 per 100 pounds, and from December 16 to April 1, 22 öre per 2 kilograms, or $1.36 per 100 pounds. This is for the ordinary sweet milk. Milk for children costs rather more and skim-milk correspondingly less. The company retails this milk from its wagons in the street at the following rates: Milk for children at 10 öre per half kilogram, ordinary milk at 8 öre per half kilogram, and skim-milk and buttermilk at 4 öre per half kilogram, which is approximately 5½ cents per quart for children's milk, 4½ cents per quart for sweet milk, and 2¼ cents per quart for skim-milk and buttermilk. The cream is sold for 27 cents per quart for first quality and 16½ cents per quart for second quality. The cream which is not sold is made into butter, and in like manner the whole milk which is returned from the wagons is creamed and the skim-milk resulting sold to poor people at half price.

The process of butter-making followed here does not differ materially from the system in use in most Danish dairies, and, as I shall presently detail the process followed in a large private dairy which I have visited, and also in a coöperative creamery, I shall for the present omit butter-making at the Milk Supply Company's creamery. I will mention, however, that I here found two pieces of dairy apparatus which are not generally known to our American dairymen, and which I find in every well-appointed dairy in Denmark. One is the Lawrence milk-cooler, and the other is a contrivance for heating the milk or cream to a temperature which kills all, or nearly all, bacteria which it may contain. This process is here called "pasteurization," after the great French scientist, who first called attention to this practical method of killing injurious bacteria. The milk-cooler is a hollow metal plate, with corrugated sides. It is about an inch thick and of any size, though usually about 2 feet square. It stands on edge, with the corrugation running horizontally. A stream of ice water runs through the inside of the plate back and forth in a zigzag course, while the cream or milk is poured into a little trough with many fine holes in a row along the bottom, which is placed on the upper edge of the cooler and from which it spreads in thin sheets over both sides of the cooler as it slowly moves to the bottom. It has the great advantage that it is easily cleaned, since the sides are not covered. There are other forms of coolers, but in those I have so far seen the principle is the same. This cooler is in general use when the cream is to be cooled rapidly to any desired temperature.

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* The unit of Danish money is the crown (krone), which contains 100 öre. One dollar is at present worth 3 crowns and 65 öre, and one cent is consequently equal to 3.65 öre.

The principle of the "pasteurizing" apparatus is equally simple. Steam is let in between the double walls of a small barrel-shaped tank or reservoir, which contains the cream or milk, and it is so arranged that the cream runs into the machine in a constant stream and out again at the same rate after having attained the desired temperature. A thermometer in the discharge pipe tells how hot it is, and the heat is regulated by admitting more or less steam through the valve on the steam pipe. This, too, is found in every dairy worthy of the name, and it is considered well-nigh indispensable when a fine grade of butter is aimed at. It is essential when an artificially prepared pure ferment is used for the cream, as it then becomes necessary to kill all other bacteria the cream may contain before it is added.

And this brings me to that point in their dairy practice which above all others places the Danes ahead of the rest of the world, and which is perhaps the leading secret of the uniformly good quality of their butter. *Pure cultures of cream ferments are in common use in all good dairies.* I shall not now attempt to describe in detail what a "pure culture" is further than to say that it consists of bacteria, which in causing the fermentation of the cream give the desired flavor and character to the butter, and which have been insolated and artificially cultivated. These "pure cultures" are offered for sale by two or three laboratories, and they have met with the practical dairyman's approval, who, as stated, makes use of them in his daily practice. This pure culture is used as a starter in skim-milk at a given temperature, and when fermented this is again used as a starter for the cream.

A DANISH DAIRY FARM.

At this stage I can not do better, perhaps, than describe briefly the practice followed in a large private dairy which I have visited. I refer to the farm named Rosenfeldt, situated near the city of Vordingborg, and which belongs to Kammerherre Oxholm. The farm contains 1,300 acres. The actual number of cows on the place was 276, which number will, however, be increased to upwards of 300 by the addition of heifers soon to come in. Of the above number of cows 223 were in milk at the time of my visit, and they produced on the average 3,400 Danish pounds per day, or 3,747 pounds avoirdupois. This gives an average of but 17 pounds per day per cow, or say, 2 gallons. If this seems like a small output, it should be remembered that it was right in midwinter when many of them were about to go dry, and that the native

Danish dairy cow is but a small animal. The average weight would perhaps scarcely reach 900 pounds per head. When these things are taken into consideration, the milk yield was not small. These cattle were fed as follows: The first feed was given them at 4 o'clock in the morning and consisted of oat straw or barley straw as the case might be. They got a liberal amount and what was left was used for bedding. At 7 a. m. they were fed their grain, which averaged about 7 pounds per head and consisted of 3 pounds barley and oats mixed and crushed, 2 pounds oilcake, usually half rapeseed cake, and half palm cake, or sunflower cake (of rapeseed cake they never fed more than 1½ pounds), and 2 pounds bran. At 8:30 a. m. they got 20 pounds sugar-beet refuse each. The beets are grown on the farm and delivered to a neighboring sugar factory, but the refuse pulp is hauled back for feed. Or if the pulp is missing mangels are fed instead. Next they are watered in the stable, the water being turned right into the mangers, and after this they get 10 pounds each of hay from the meadow. The hay is of mixed grasses containing also some clover. This completes the feeding for the forenoon. At 1 p. m. the feeding begins again with the same feeds in the same quantities, beginning first with the grain, then roots, water, hay, and straw, keeping them busy eating all the afternoon, the straw being fed at 7 p. m., and this time wheat straw.

The milking begins at 4 o'clock in the morning and at 4 o'clock in the afternoon. It is all done by women, who each milk 20 cows, and they do it in two to two and one-half hours. The churning temperature is 55° F., and butter comes in about thirty minutes.

The particular ferment which was used in this dairy received the following treatment: It is sold in bottles holding about a pint, all of which is used at one time. It is not added directly to the cream, but is first propagated in skim-milk. For this purpose the milk from a fresh cow should, if possible, be selected. The milk is set in ice water for twelve hours and then skimmed by hand. It is next sterilized by being heated to 180° F., at which temperature it should be kept for two hours. It is then cooled to 82° F. and the bottle of ferment is added, and this temperature should, as far as practicable, be maintained during the next twenty or twenty-four hours while the ferment is growing, which takes about that time. At the close of this process another batch of skim-milk is sterilized as before. It is next cooled to 50° F., then again warmed to 82° F., and 10 per cent of its weight is added to it from the ferment made the previous day. This stands again another twenty-four hours at the same temperature as near as may be, and then it is ready to be added to the cream, for which purpose the cream should be at 70° F.

A herdsman styled "feed-master" has charge of the feeding. The milk is, of course, weighed as fast as it arrives at the dairy, but twice a month there is a "trial milking," at which the milk is weighed from each cow, which enables them to get an approximately correct idea of the yield of each cow. The cows do not get out of the barn all winter. When tied up in the fall they remain there till they are put in pasture the following spring, which usually occurs the latter part of May. This, I find, is the practice on nearly all dairy farms.

The morning milk is run through the separator as fast as it arrives in the dairy from the barn, and the evening milk stands in the vat and is separated also in the morning.

The cream runs from the separator into the "pasteurizing" or sterilizing apparatus, where it is heated to 167° F., after which it is at once cooled on the cooling apparatus to 44° F. This heating and cooling is completed by about half-past seven in the morning, and from that hour until 10 a. m. it stands in ice water. It is then heated again, but this time only to 70° F., at which temperature the prepared cream ferment is added, and it now stands for about twenty hours, or until 6 a. m. the next morning, at a temperature of 56° to 58° F. as far as possible, while the ferment does its work, and then it is churned. The amount of ferment added to the cream will in a measure depend upon the season, the cows, and other conditions. In the dairy to which this refers it was found that of this impregnated milk 4 to 5 per cent of the weight of the cream should be added at this season to have the proper effect. And now to perpetuate the ferment another batch of skim-milk is prepared, as before described, to which 10 per cent of its weight is added from the lot used to impregnate the cream. And so it goes on from day to day. The ferment is perpetuated in sterilized skim-milk which is prepared fresh every day, and what was made yesterday is to-day used both to ferment the cream and to start a new lot in fresh skim-milk. On Mr. Oxholm's dairy farm it is found necessary to get a fresh lot of ferment from the laboratory about once in six weeks.

I have briefly described the process followed on this farm because the butter made there stands in high repute. It frequently takes prizes at the national butter exhibits, and I was told that it brought usually 6 crowns per 100 pounds above the top market quotation. It is all exported to England. Nearly all the work in this dairy was done by women, and the chief dairymaid was certainly a competent person. Most of the skim-milk was made into cheese of good quality. It is possible to make good cheese from skim-milk, but the success lies in the knowing how, and I believe the time is coming when good skim-milk cheese will find a market in America.

At Rosenfeldt it required at this season 29 pounds of milk to make a pound of butter. The cream loses some of its butter by being sterilized as it was here.

Mr. Oxholm kindly drove me to a coöperative creamery owned by a company of farmers in the neighborhood, and which was known as "Renkolde" creamery. It consists of a substantial brick building equipped with engine and all necessary machinery.

The total cost of the plant was 32,000 crowns, or about $7,500. All this money was borrowed, and all who delivered milk there became partners in the company, but each also became responsible for a share of this debt. The milk was paid for with the maximum price per pound of butter quoted by the exchange for 28 pounds of milk, this amount being taken as the standard necessary to make a pound of butter. The price for milk, therefore, varied from week to week with the price of butter. Payment to contributors was made on the 7th of every month. At this dairy they handled the milk from about 1,100 cows and made at that time about 350 pounds of butter a day. The superintendent informed me that he made a pound of butter from 25 pounds of milk and that during the past year the contributors of milk had received 65 öre (17 cents) per 100 pounds of milk over and above the prices agreed upon, besides paying all expenses and reducing the debt by 2,000 crowns. It was pay-day the day I called and one could tell from the cheerful faces of the members that they were satisfied with the business. I shall take occasion to describe this class of dairies more fully in my final report.

Compared with our Jerseys, Holstein-Friesians, and milking Shorthorns, the Danish dairy cattle do not impress me very favorably. Their milk is not rich enough in butter fat. I have seen no analysis of their milk that exceeded 3½ per cent of fat and most of them fall below that. They are, however, a hardy little race, thoroughly adapted to the somewhat austere conditions under which they live.

APPENDIX.

In letters previously received from Prof. Georgeson he gives some interesting data regarding the trade in Danish butter in the London market, which are appended as affording interesting evidence of the success attending the infinite pains and scientific methods with which the dairy industry is pursued in Denmark. Prof. Georgeson writes:

> All the testimony I gathered agrees in this, that the Danish butter brings the top price in the English market with one exception, and that exception is made in favor of the comparatively small amount of fresh unsalted butter shipped to London from northern France. It caters to the taste of a small but select class of consumers, and it reaches their tables inside of twelve hours from the churn. This butter, I was told, brings from one to three or four pence more per pound than the Danish butter. I tasted this butter, and to me it lacked flavor and the pleasant briskness peculiar to a fine grade of salted butter, but there is no accounting for tastes. There is a market for such butter in London and the dairymen from northern France supply it. The Danes have tried to supply it, but their product can not reach England in less than three days, and this length of time was fatal to the rich, creamy flavor which the market demanded, and the attempt was given up.
>
> I found also that the Danish butter finds its best market in the manufacturing towns, and that these consume relatively much more of it than the capital. This would indicate that it goes especially to the middle class and well-to-do artisans.

I inquired particularly about the manner of shipment and whether any attempt was made to keep it in a uniform temperature during transit, and I found that so far the temperature had not been controlled. It had been tried and proved that nothing was gained by it. The conditions are such that it must be handled several times, and often many times, between the dairy and its destination. It must be transferred from wagon to railway, and from railway to boat, several times, following the route of transportation from island to island to the port of shipment, and during these transfers it is often exposed for hours to a burning heat or chilling cold, which would so far affect it that no attempt to equalize the temperature where it could be controlled could remedy the damage it might already have received, while it stood in the sun on the wharf or railroad station. It is true only a very small per cent is injured from these causes, but the risk still exists. Transportation which shall be absolutely safe to the texture and flavor of the Danish butter is still an unsolved problem. Nearly all Danish butter is packed and shipped to England in small barrels, of which there are two sizes, holding, respectively, 56 and 112 pounds. This sort of package is easily handled and has become customary. The Australian and New Zealand butter is usually shipped in square boxes, holding almost 36 pounds. The French butter above mentioned is done up in 2-pound rolls and forwarded in baskets containing usually 24 pounds. To my surprise I found in several of the warehouses considerable quantities of Russian butter. Russia began to ship butter to England five or six years ago, and the amount is growing year by year. It is put up in barrels in imitation of the Danish butter.

The Danish butter maintains its high standing chiefly through its uniformity. I sampled numerous packages from various parts of the country and found them very nearly all alike. It is all first class; it all has the same bright straw color, and the same degree of saltness, and it varies but very slightly in aroma, flavor, and texture. Mr. Jacobsen told me that he had endeavored to secure consignments of a cheaper grade of butter, as he thought he had a market for it, but word came back that it could not be found; no inferior butter was offered for export. This uniformity in quality inspires both dealer and consumer with confidence. They know they can buy the Danish butter and be sure of getting a good article without necessitating their tasting it before they purchase. Not so, I was told, with other countries. While they might forward some very fine butter, it was never safe to depend upon it.

As to the prices which wholesale dealers in London realize on Danish butter, they rule low from an American point of view. There are fluctuations, of course, but it sells generally from fourteen to eighteen pence a pound, the latter figure being considered high.

To give an idea of the growth of the Danish export butter to England in recent years, I quote the following figures from the "Annual statement of the trade of the United Kingdom," which I procured. It is an official and entirely reliable publication:

English imports of butter from Denmark.

	Cwts.		Cwts.
1887	487, 536	1890	824, 749
1888	604, 422	1891	876, 211
1889	677, 398	1892	863. 522

Value of same in pounds Sterling.

1887	2, 668, 694	1890	4, 422, 257
1888	3, 334, 364	1891	4, 865, 842
1889	3, 742, 860	1892	4, 848, 735

I can not comment on these figures now, but they speak for themselves. At the same time the import of butter from the following countries has also increased: Sweden, Russia, Belgium, France, United States, New South Wales, New Zealand,

and Canada. The greatest increase has been made by New Zealand, but still t largest import therefrom was in 1891, and amounted to only 28,647 cwts. The i ports of butter from Norway, Germany, and Holland have materially decrease this time.

In a more recent communication Prof. Georgeson makes the follow statement:

I will, however, mention in this connection, that the reason the working dairy which it was at one time planned that Denmark should exhibit at Chicago this year has been abandoned is that they do not wish to teach Americans the secrets of their success in butter-making. That I have heard from several sources, and I have today seen it stated in "Politiken," a daily newspaper.

* * *